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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/059,907	01/29/2002	Kyle M. Hanson	29195.8122US1	8516

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EXAMINER	
ZHENG, LOIS L	
ART UNIT	**PAPER NUMBER**
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/059,907	HANSON ET AL.	
	Examiner	Art Unit	
	Lois Zheng	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 October 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 26-28,31-33,49-52,55-60,91 and 92 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 26-28,31-33,49-52,55-60,91 and 92 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 25 October 2007 has been entered.

Status of Claims

2. Claims 26, 49 and 91 are amended in view of applicant's claim amendments filed 25 October 2007. Claims 1-25, 29-30, 34-48, 53-54 and 61-90 are canceled in view of applicant's amendment. Therefore, claims 26-28, 31-33, 49-52, 55-60 and 91-92 are currently under examination.

Status of Previous Rejections

3. The rejections of claims 26-28, 31-33 and 49-52 under 35 USC § 102(e) as being anticipated by Reid et al. US 6,126,798(Reid) in view of Woodruff et al. US 6,228,232 B1(Woodruff) or WO 00/03067(WO'067) are withdrawn in view of the claim amendment filed 25 October 2007.

The rejections of claims 55-60 and 91-92 under 35 U.S.C. 103(a) as being unpatentable over Reid in view of Woodruff and further in view of Okinaka et al. US 4,469,564(Okinaka) are withdrawn in view of the claim amendment filed 25 October 2007.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 26-28, 31-33 and 49-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reid et al. US 6,126,798(Reid) in view of Runsten US 4,391,694 (Runsten).

Reid teaches an electrochemical apparatus comprising a cup shaped plating bath with an open top(Fig. 1 #42, Fig. 2 #42A), a microelectronic workpiece support disposed proximate the open top of the processing cup(Fig. 1 # 34), one or more conductive members electrically contacting the microelectronic workpiece(col. 4 lines 27-29), an anode cup at the bottom of the processing cup for housing an anode(Fig. 2 #202) and a shaping membrane disposed over the open top of the anode cup(Fig. 2 # 208).

Regarding claims 26 and 49, the wall of the cup shaped plating bath as taught by Reid reads on the claimed one or more walls defining a processing space. The anode cup as taught by Reid reads on the claimed electrode housing. The shaping membrane as taught by Reid reads on the claimed pressure drop member. The space between the bottom of the anode cup and the shaping membrane as taught by Reid reads on the claimed interior region of the electrode housing as recited in claim 26 and the claimed interior electrode chamber as recited in claim 49. The space between the shaping

membrane and the microelectronic workpiece as taught by Reid reads on the claimed processing space.

Reid's electrochemical apparatus also comprises the claimed first fluid inlet(Fig. 2 # 228 or 236), the claimed first fluid outlet(Fig. 2 #240 or 242) in fluid communication with the interior region, the claimed fluid tube(Fig. 2 #244 or 246) coupled to the first fluid outlet taking the fluid from the interior region to outside of the reactor, the claimed second fluid inlet(Fig. 2 #200) and the claimed second fluid outlet(Fig. 1 # 54) in fluid communication with the processing space exterior to the interior region.

In addition, even though Reid discloses multiple inlets(Fig. 2 # 220, 228 and 236) for providing electrolyte to the anode cup, Reid also teaches that these inlets are equipped with check valves. In addition, two of these inlets(Fig. 2 #228 and 236) are connected to a pump that pumps electrolyte from an alternative source of electrolyte(col. 6 lines 46-67). Furthermore, Reid teaches that one or more of these inlets can be provided. Therefore, the flow to these inlets can be controlled, minimized or even reduced to zero. Based on these teachings, the examiner concludes that the electrochemical apparatus as taught by Reid is capable of generating an electrolyte flow through the pressure drop member into the electrode housing.

However, Reid does not explicitly teach the amended feature that the claimed "fluid from the process space exits the reactor via the second fluid outlet separately from the fluid tube".

Runsten teaches an electrochemical processing apparatus, wherein one outlet tube(Fig. 1 #34) is connected to the anode receptacle(Fig. 1 #12) and another outlet

tube(Fig. 1 # 25) is connected to the processing space. Both electrolyte outlet tubes exit the reactor separately and reunite in the electrolyte reservoir(Fig. 1 #26). In addition, the drained electrolyte from the reservoir is then filtered(Fig. 1 #28) to remove contaminant particulates before re-entering the electrochemical cell(Fig.1 #1) via an inlet pipe(Fig. 1 #29).

Although Reid's apparatus rejoins the electrolyte from the anode housing and the overflow electrolyte from the processing space before exiting the electrochemical cell, Reid also teaches that it is important to remove the contaminant particulates from the anolyte before sending it back the electroplating bath(col. 7 lines 30-35).

In light of the teachings of Runsten and Reid, one of ordinary skill in the art would have found that providing separate outlets for the electrolytes from the interior region and the processing space to outside of the reactor before joining the electrolytes for subsequent filtering and recycling as taught by Runsten is a viable alternative to joining the electrolytes from the interior region and the processing space before exiting the reactor and then subjecting the combined electrolyte for further filtering and recycling after the combined electrolyte exits the reactor as taught by Reid because both methods perform the same function of draining the spend electrolyte and removing the contaminates from the electrolyte. Therefore, one of ordinary skill in the art would have found it obvious to have adapted the separate electrolyte outlet paths to outside of the reactor as taught by Runsten into the apparatus of Reid with predictable results of draining the processing fluid from the interior region and the processing space of the electrochemical reactor for subsequent filtering and recycling.

Regarding claim 27, Reid teaches the claimed anode electrode.

Regarding claim 28, it is well known that an electrode that functions as an anode in an electroplating process can function as a cathode in an electropolishing process. Therefore, the electrode that functions as an anode in the electroplating process as taught by Reid is capable of functioning as a cathode when current is applied in opposition direction.

Regarding claims 31 and 50, the shaped membrane as taught by Reid can be a permeable membrane as claimed(col. 9 lines 29-31).

Regarding claims 32-33 and 52, the membrane of Reid is conical in shape having an apex directed toward the interior region of the electrode housing as claimed.

Regarding claim 51, Reid further teaches the claimed membrane frame connected to the membrane and supporting the membrane over the open end of the electrode housing as claimed(Fig. 2 # 312 & 314, col. 5 lines 21-34).

6. Claims 55-60 and 91-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reid in view of Runsten, and further in view of Okinaka et al. US 4,469,564(Okinaka).

The teachings of Reid in view of Runsten are discussed in paragraph 5 above. However, Reid in view of Runsten do not explicitly teach the claimed ion selective membrane.

Okinaka teaches using anode surrounded by a cation-permeable membrane in a copper electroplating bath(abstract).

Regarding claim 91, it would have been obvious to one of ordinary skill in the art to have incorporated the cation-permeable membrane as taught by Okinaka into the shaped membrane of Reid in view of Runsten in order to prevent decomposition of additives in the plating bath and to lengthen the bath life time and improve control of bath chemistry and plating quality as taught by Okinaka(abstact).

In addition, the cup shaped plating cell as taught by Reid in view of Runsten and Okinaka reads on the claimed fluid vessel, the cation-permeable membrane as taught by Reid in view of Runsten and Okinaka reads on the claimed ion selective membrane. The space between the cation-permeable membrane and the anode cup in the apparatus of Reid in view of Runsten and Okinaka reads on the claimed first fluid flow region. Any of the electrolyte inlets 220, 228 and 236 as taught by Reid reads on the claimed first fluid flow entry. Either of the electrolyte outlets 240 and 242 as taught by Reid reads on the claimed first fluid flow exit. The anode of Reid reads on the claimed first electrode. The space between the cation-permeable membrane and the microelectronic workpiece as taught by Reid in view of Runsten and Okinaka reads on the claimed second fluid flow region. The electrolyte inlet 200 reads on the claimed second fluid flow entry. The overflow weir defined by the top of the cup shaped plating cell as taught by Reid reads on the claimed second fluid flow exit. The conductive members electrically contacting the microelectronic workpiece as taught by Reid in view of Runsten and Okinaka reads on the claimed second electrode.

Regarding claim 92, the cation-permeable membrane as taught by Reid in view of Runsten and Okinaka meets the limitation of the instant claim 92.

Regarding claim 55, the cation-permable membrane as taught by Reid in view of Runsten and Okinaka is conical shape with an edge region of the membrane disposed closer than the central region of the membrane to the workpiece support as claimed.

Regarding claim 56-58, Reid further teaches recites a virtual anode and a shield (Fig. 1 #53 & 55). Details of the virtual anode and the shield is described in US Patent Application No. 08/969,267, now US Patent No. 6,179,983 B1(US'983), which is incorporated into Reid(col. 4 lines 43-45). Some of the virtual anodes as described in Figs. 2-5 of US'983 with plurality of openings meet the limitations of instantly claimed flow distribution element as recited in claim 56. Fig. 6 of US'983 further teaches a shield member(# 250) between the anode and the micronelectronic workpiece, and the shield having a rim and an opening disposed annularly inwardly from the rim as recited in claim 57. The shield as taught by US'983 is a field shaping element as claimed(col. 7 lines 15-34).

Regarding claim 59, Reid teaches the claimed microelectronic workpiece (Fig. 1 #38).

Regarding claim 60, the electrolyte entering the interior region of the electrode housing via any of the inlets 220, 228 and 236 as taught by Reid in view of Runsten and Okinaka reads on the claimed first processing fluid. The electrolyte enters the processing space of the electrochemical apparatus via inlet 200 as taught by Reid reads on the claimed second processing fluid.

Response to Arguments

7. Applicant's arguments filed 25 October 2007 have been considered but are moot in view of the new rejection ground.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LLZ

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